VEON Forestry, Ecology & Environment

Forestry Report

Moanmore Lower Wind Farm

Co. Clare

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Definition of Terms

- **Afforestation**
  The establishment of a forest in areas where the preceding vegetation or land use was not forest.

- **Buffer zones (or exclusion zones/setback areas)**
  A buffer or exclusion zone is a specific area where harvesting machines are not permitted to travel through, and which is managed for environmental protection and enhancement. Setback areas are used at the afforestation or replanting stages to introduce a buffer strip between a new forest and sensitive habitats or features.

- **Clear-felling**
  The final stage in a typical commercial forestry crop cycle, where an entire standing crop of trees is removed from an area (also known as clear-cutting or clearcut logging).

- **Coupe**
  A small area of forest within a compartment that is harvested in a single operation.

- **Endemic windblow**
  The uprooting of trees in forests during typical winter storm events.

- **Eutrophication**
  A process where a high concentration of nutrients has been introduced into a watercourse which promotes an excessive growth of algae which can deplete oxygen levels in the water and deleteriously affect aquatic life.

- **Hectare**
  A unit of land area equal to 10,000 square metres, or 2.4711 acres.

- **Mound Drains**
  Formed by an excavator digging drains at regular intervals and heaping the excavated soil in mounds. Trees are then planted into the mounds which provide an elevated vegetation-free zone.

- **Plantation**
  A forest or tree crop established by the manual planting of saplings or seedlings.

- **Relevant watercourse**
  Any other watercourse that has the potential to act as a pathway for the movement of significant amounts of sediment and/or nutrients from the site to an aquatic zone. These include existing drains/channels and other potential pathways that may contain flowing water during and immediately after periods of rain.

- **Rotation**
  The period of years required to establish and grow a timber crop to a specified condition of maturity, when it may be harvested, and a new tree crop started.

- **Sawlog**
  The most profitable wood product that is widely used for construction. Sawlogs are 3.7 metres or greater in length and have a minimum diameter of 20 cm.

- **Snedding (or delimbing)**
  The removal of side branches from a felled tree to leave a smooth log.

- **Stand**
  An aggregation of trees occupying a specific area and uniform enough in composition (species), age and arrangement to be distinguishable from the forest in adjoining areas and considered a homogenous unit for management purposes.

- **Top height**
  The average height of a number of top height trees in a stand, where one top height tree is the tree of largest diameter at breast height (DBH) in a 0.01 ha sample plot.

- **Windblow**
  The uprooting of trees by wind.

- **Windsnap**
  The breakage of tree trunks (or boles) above ground by wind force.

- **Yield Class (YC)**
  This is defined as the potential growth rate or yield of a forest, expressed as cubic meter per hectare per year.

1. Project background

This report has been prepared to assess the impact of a proposed wind farm development upon existing forestry within the project red line boundary area. The proposed development site comprises circa 36.77 hectares, and the erection of 3 No. 4-5MW wind turbines with an overall ground to blade tip height of 150 metres is planned (as outlined in Chapter 2 of the EIAR).

This report will outline the existing forest environment within the development area and the impact of the proposed project construction on the same. An overview of forest harvesting operations that would occur on the site is also presented, including the relevant environmental considerations and necessary mitigation measures and the legal/replanting obligations associated with the felling proposed to occur.

1.1 Site Description

The proposed development area is situated in the townlands of Moanmore Lower, Moanmore South, Tullabrack East and Gower South in Co. Clare, c. 3 km north-west of the town of Kilrush, 6.8 km south-west of Cooraclare village, and 7.1 km north of the county boundary between counties Clare and Kerry. The main approaching roads are the N67 and the R483, and the geographic location of the site presents reasonable access to the harvesting network of timber buyers nationwide.

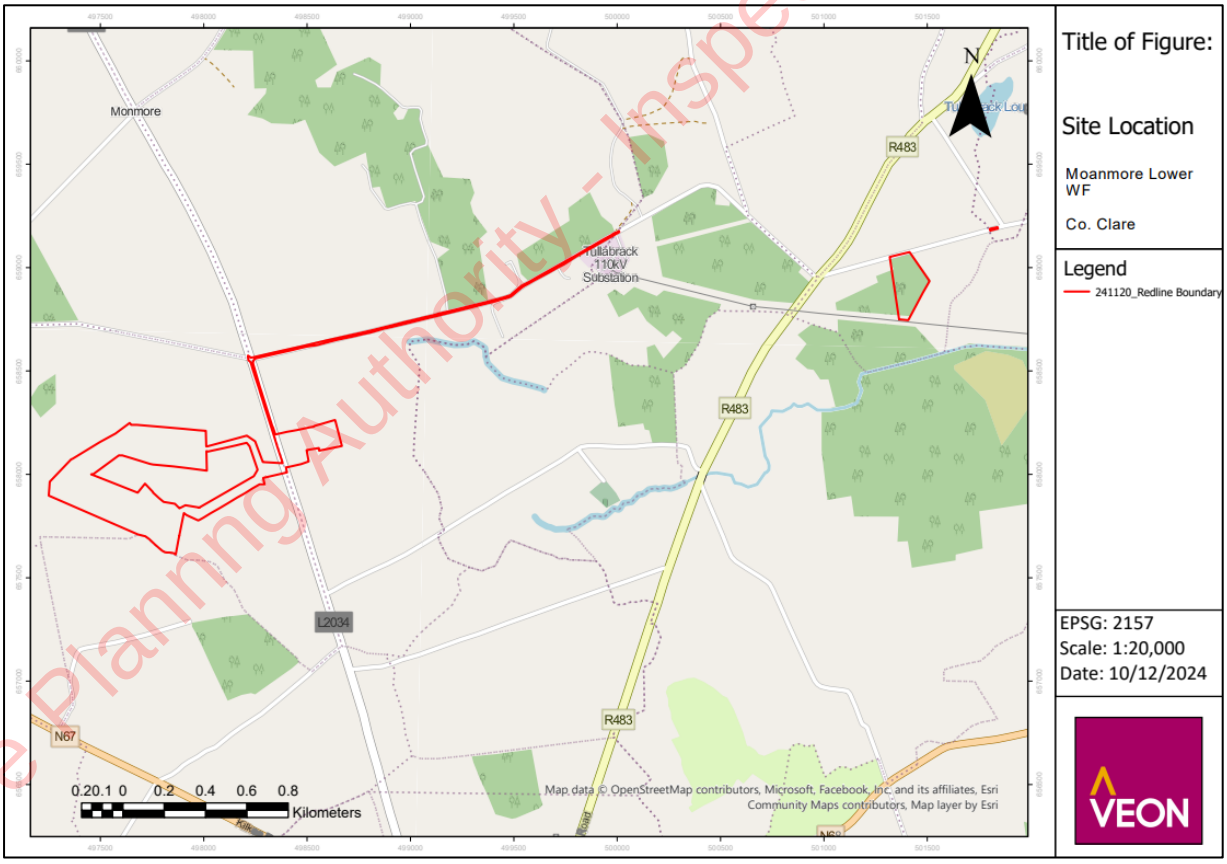

Figure 1.1: Location of the proposed wind farm development.

Forestry removal within the development area is confined to the Tullabrack East section, where the construction of a Blade Transfer Area is proposed. The trees at this location are predominantly underlain by cutaway/cutover peat, and the area is relatively flat (<15% slope) and sits at an elevation of c. 31 metres above sea level. The felling area does not

contain any aquatic zones: the Gowerhass [27G13] stream flows c. 215 metres east of the felling area, while the Ballykett [27B52] stream flows c. 358 metres to the west. Both streams feed into the Moyasta 27 [27M04] river, flowing in a westerly direction c. 350 m south of this area. Relevant watercourses feature on the eastern and southern boundary of the forestry at this location, but do not overlap with the area where felling works would occur.

The felling site does not overlap with any designated conservation areas, though the Lower River Shannon SAC (002165) and the River Shannon and River Fergus Estuaries SPA (004077) are found within 5.4 km.

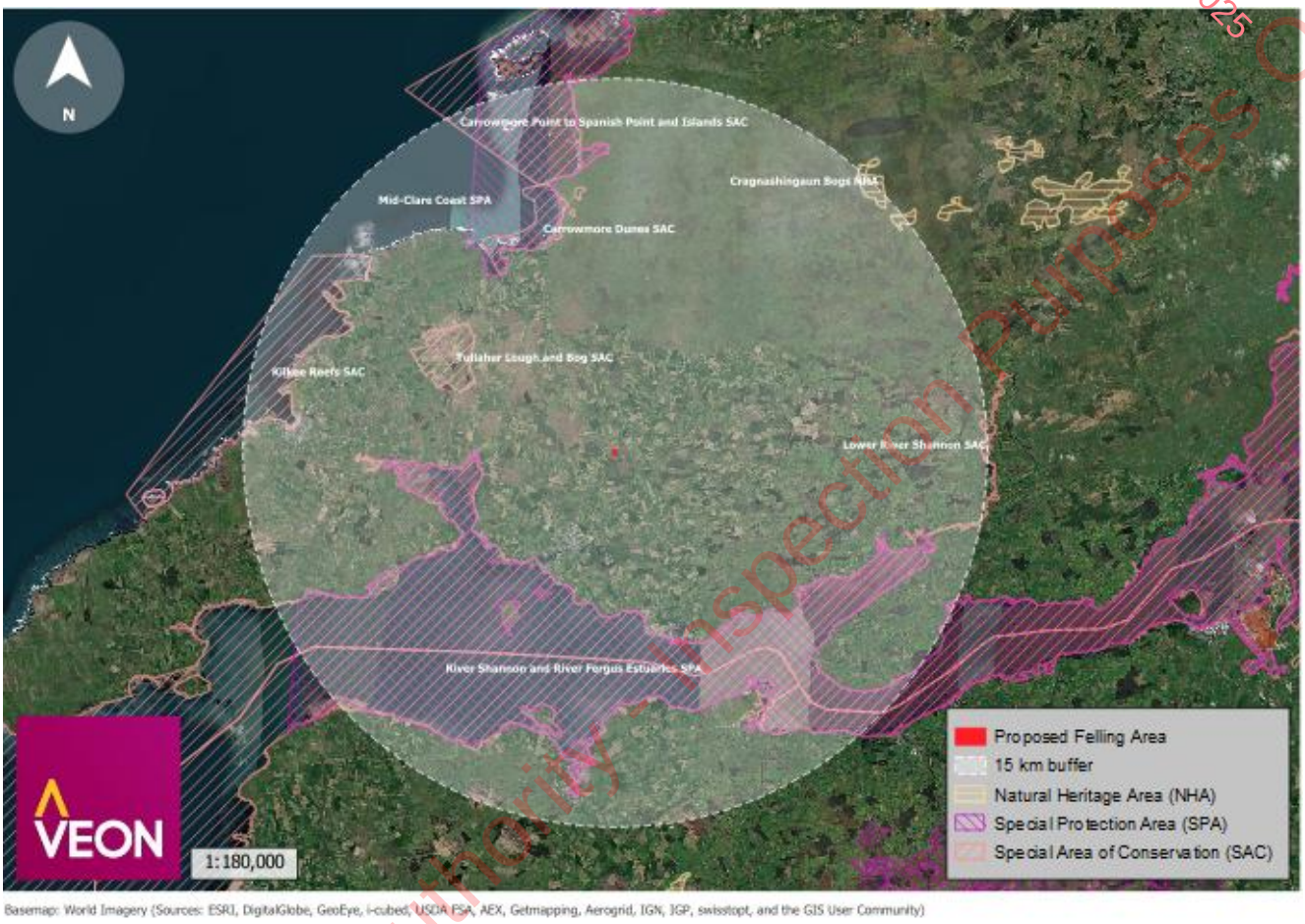

Figure 1.2: Designated conservation areas within 15 km of development area.

There are several other designated conservation areas within 15 km of the proposed felling area, as shown in Figure 1.2 and Table 1.1.

Table 1.1: Designated Conservation Areas within 15 km of development area.

#	Name	Site Code
1	Cragnashingaun Bogs NHA	002400
2	Mid-Clare Coast SPA	004182
3	Tullaher Lough and Bog SAC	002343
4	Kilkee Reefs SAC	002264
5	Carrowmore Dunes SAC	002250
6	Carrowmore Point to Spanish Point and Islands SAC	001021

The proposed felling location does not contain or is not contiguous to (i.e. ≤ 200 m) any recorded sites or monuments of archaeological interest: the nearest recorded site is an earthwork (CL057-027----) which is found c. 705 metres north of the felling site.

A high-voltage 110 kV powerline exists c. 130 m south of the felling area, with an associated 61-metre unplanted corridor which separates the two blocks of conifer forestry at this location.

1.2 Description of existing forestry within proposed development area

The redline boundary encompasses approximately 3.07 hectares of existing commercial forestry, all of which is privately owned. Beyond basic timber production, the range of benefits that these forests cover is limited but would encompass some biodiversity, conservation, environmental protection and carbon sequestration. Figure 1.3 illustrates the location of the private forestry within the proposed development planning boundary.

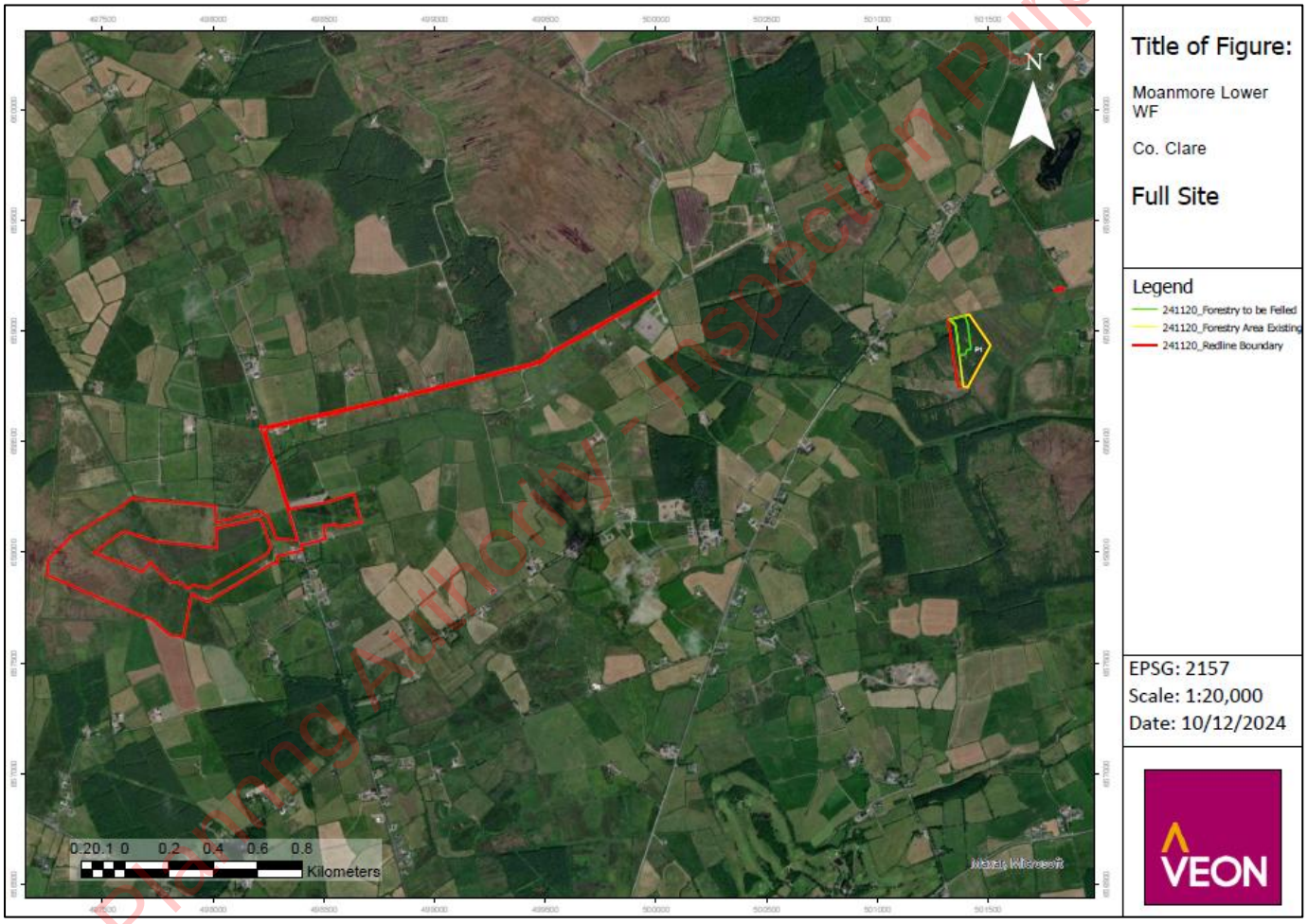

Figure 1.3: Existing forestry within the redline boundary area.

The proposed locations of the 3 No. wind turbines at Moanmore Lower do not overlap with any existing forestry. However, the permanent felling of trees will be required for the construction of a Blade Transfer Area at Tullabrack East, adjoining the L-6132. Additionally, to facilitate the construction of the site entrance to the Blade Transfer Area, the removal of a section of hedgerow of approximately 70 m in length will be required. This hedge adjoins the conifer forestry and is no longer managed as a field boundary. A summary of the affected forestry for the Moanmore Lower WF project is presented in Table 1.2.

Table 1.2: Forestry affected by the proposed wind farm infrastructure.

Infrastructure	Forestry plot	Tree Species Present	Planting Year	Plot area (ha)	Mixture type	Est. Yield Class
Blade Transfer Area	**P1**	Sitka spruce (*Picea sitchensis*)	1994	3.07	Pure	18

1.3 Existing forestry and certification

Forest certification is a process through which the quality of forest management is assessed against an agreed set of standards and principles. It is a voluntary process that promotes the monitoring of forests and the labelling and tracing of logs and wood/non-wood forest products. The certification of forests is underpinned by two key processes:

- Examining forests to see if they are being managed in line with a measurable set agreed set of standards and objectives. This involves an independent third-party assessment by a professional auditor of a forest owner's management practices against the standards that are set out in a forest management plan.

- The labelling of timber that has been harvested from a well-managed forest, known as Chain of Custody (CoC) Certification: this involves an independent third-party chain of custody inspection to trace timber harvested in certified forests through all subsequent stages of processing, marketing and transport.

Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC) are the two international forest certification schemes that are currently operating in Ireland (Teagasc, 2021).
The private forestry that would be impacted by this wind farm development is not currently being managed under forest certification.

2. Potential impacts of the proposed development

Compared to many other EU countries, the wind climate in Ireland is lively, with high rainfall and gales prevalent, which can give rise to trees blowing over in forestry stands and renders wind the major abiotic factor affecting Irish forestry (Ní Dhubháin, 1998). The resilience of a tree or trees to wind forces is influenced by a multitude of factors including site, stand and tree characteristics (Peltola *et al.*, 2013). On a wider level, topography and the windiness of the regional climate are important functions in the wind damage of forests (Miller, 1985).

As outlined by Quine et al. (1995), trees have two principal resistive forces to blowing over - root anchorage and crown contact with adjacent trees. The susceptibility of trees to wind damage is also influenced at the crop level by tree height and tree species (Albrecht *et al.*, 2012) and the underlying soil conditions (Miller 1985). This section provides an overview of tree and wind turbine interactions and outlines the potential impacts of the proposed wind farm on existing forestry in the development area.

2.1 The potential impact of trees on wind turbines

A forestry crop, with a typically rough and uneven canopy, acts as a barrier to the wind and can cause wind shears (i.e. changes in wind speed and direction). Forestry in proximity to a wind turbine can give rise to more substantial turbulence than what would otherwise occur over more open ground. This can reduce the overall wind speed above the forest canopy and turbulent airflow can send vibrations through the turbine blades, leading to increased stress on

the turbine drive trains and a reduced capacity to exploit wind-generated energy (Department of Agriculture, Food and the Marine, 2017; Irish Wind Energy Industry, 2012).

2.2 The potential impact of wind turbine development on trees

The felling of coupes of trees to accommodate a wind farm has the potential to adversely affect the remaining forestry and the wider local environment. Where large areas of a forest canopy are opened during felling for a wind farm, newly exposed edge trees—that would now stand immediately adjacent to the coupe—will have reduced capacity to absorb wind forces as the support of neighbouring trees has been removed. These trees will not have had time to adapt to the new wind environment, thus rendering them vulnerable to blowing over (Mitchell, 1995; Peltola *et al.,* 2013; Quine and Gardiner, 2007). Additionally, the wind blowing on the opened canopy will now typically be more turbulent and the soil beneath the canopy gaps will be increasingly exposed to precipitation, which may reduce its resistance to erosion (DAFM, 2002).

Figure 2.1: Windblown conifer trees on a commercial forestry site.

Once trees begin to blow over nearby trees are at risk of either being hit by the falling trees - which can cause stem breakage or canopy loss; or as a consequence of the creation of gaps - which will allow the wind to penetrate further into the canopy (Quine and Gardiner, 2007). Other potential impacts include damage to existing drainage networks - which could give rise to waterlogging and enhance the risk of additional windblow as the rooting and stability of trees are reduced (Ní Dhubháin and Farrelly, 2018), and woody debris entering waterways: debris from windblow events can cause excessive shading or a change of flow patterns in aquatic zones and limit the movement of fish (Giller et al. 2002) or wildlife in an area (Mitchell, 1995).

2.3 The potential impact of the proposed development on existing forestry

To facilitate the construction of a Blade Transfer Area at Tullabrack East, 0.85 hectares of forestry would need to be permanently removed through infrastructure felling (Figure 2.2). The forestry in this area has been grown thus far as part of a silvicultural rotation, which would be due for harvesting in the future, irrespective of whether a wind farm was being implemented or not.

Tree growth at this location has been mixed and is patchy in many areas due to the poor underlying soil, with average yield class productivity (YC 18). Keyhole tree felling here would give rise to newly exposed edge trees and, considering the underlying soil and the proximity to the west coast, some windblow or windsnap may occur. However, considering the age profile of the trees and the characteristics of the site, it is possible that these trees will be clear-felled in advance of the potential wind farm construction works (see TFL00940623 on the Forestry Licence Viewer – a recently approved licence indicating potential clearfell within 2 years of this report), which would negate the risk of wind damage as the site may be cleared or at the early stage of a new rotation: young, small trees would have time to adapt to the new conditions created by the felling works.

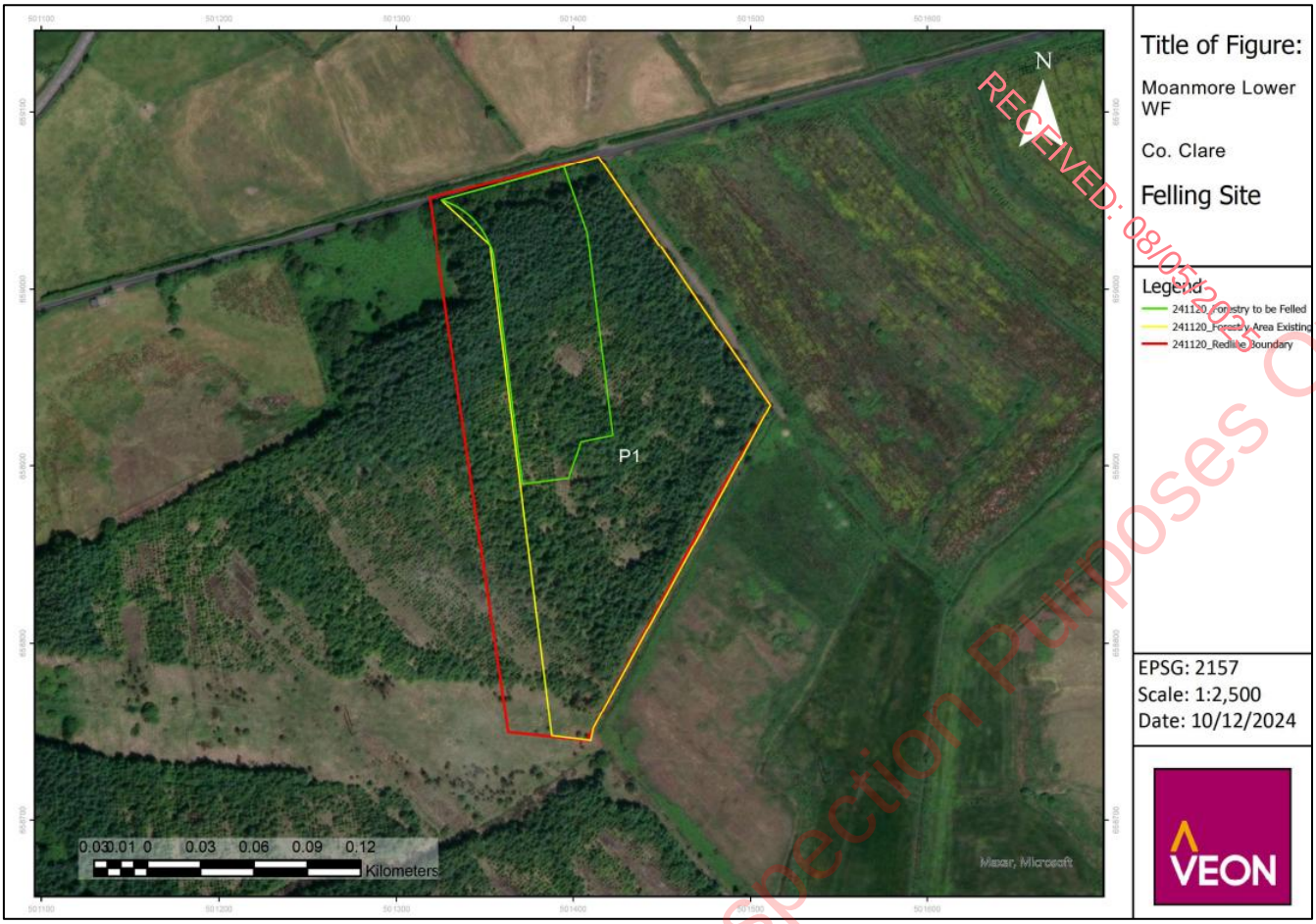

Figure 2.2: Infrastructural felling for proposed Blade Transfer Area

2.3.2 Additional considerations

For mature forestry located on moderately sloping ground, the harvesting method for a typical clear-felling programme will comprise mechanised harvesting and extraction by a wheeled forwarder. Harvesting operations within forested areas has the potential for several negative impacts:

- **A loss of wildlife habitats** - the effects of loss or change of habitat are considered in the biodiversity chapter of the EIAR. However, the following observations are made concerning the proposed development:

- The felling area is comprised of conifer plantation (WD4) habitat, underlain by peat soil with a species-poor ground layer, which would have limited biodiversity value. In addition, the total area of forestry permanently removed would be planted on a compensatory basis on replacement land and thus does not present an overall wider loss of forestry habitat. Where conifer species are replanted on replacement lands, these must now include a 20% broadleaf component under the Forestry Programme 2023-2027, which will provide benefits to the local environment.

- **Increased soil particles or wood residues entering watercourses** - issues relating to potential water pollution from construction activities are dealt with in the Biodiversity, Soils, and Water chapters of the EIAR. However, the following observations are made concerning the proposed development:

- The risk of particles and residues entering watercourses during felling operations for a wind farm development is no different from the risk arising from regular harvesting of forest crops. Provided the appropriate guidelines are followed, and their use strictly enforced during harvesting operations, the risk of adverse effects should be reduced where tree felling is concerned.

- **A loss of carbon sequestration potential –** upon removal of trees from the development area the overall carbon sequestration of the affected forests is reduced. However, the following observations are made concerning the proposed development:

- The removal of trees to facilitate the construction of a wind farm is a temporary effect, as an equivalent area of replacement land(s) must be planted to compensate for the felled trees. A proportion of trees felled as part of this development may be converted to panels, furniture or construction timber where carbon will be stored in the long term.

- **An increase in road traffic during the extraction phase and noise disturbance** – the felling of trees will require timber lorries to transport the felled logs from the site. However, the following observations are made concerning the proposed development:

- Noise generated on the development site would derive from harvesting machinery and timber haulage vehicles. The level of noise that would arise during harvesting is not considered a significant issue, as it would occur during daylight hours, would be short-lived and would resemble noise created by agricultural machinery in the surrounding environs. Additionally, considering the felling area (0.85 ha), a major increase in road traffic would not arise during timber haulage, and any increase from existing felling plans would be moderate and a temporary inconvenience.

3. Felling Operations

Felling (i.e. timber harvesting) describes the cutting and extraction of timber to the roadside, usually during thinning or clear-felling operations and can only be conducted when a tree felling licence has been approved. A felling licence is granted by the Minister for Agriculture, Food, and the Marine, and provides authority under the Forestry Act 2014 to fell or otherwise remove a tree, or trees, or to thin a forest for silvicultural purposes. The Forestry Act 2014 prescribes the functions of the Minister and details the requirements, rights, and obligations associated with tree felling licences. The Forestry Regulations 2017 (S.I. No. 191 of 2017) are the principal set of regulations giving further effect to the Forestry Act of 2014.

3.1 Harvesting types

3.1.1 Thinning

Thinning is a silvicultural intervention that removes inferior-quality trees from a stand. It affords the remaining stems with more growing space and resources, thereby increasing the overall quality and size of the remaining forest and producing a more saleable product. The resulting gaps in the canopy also permit more sunlight and rainfall to reach the underlying soil, increasing soil temperature and levels of moisture which will promote the growth of ground flora (Kerr and Haufe, 2011).

First thinning in conifer forests typically involves the complete removal of every sixth or seventh line of trees (called racks) to gain access into a forest, while inferior trees are then selected for removal between these racks. The resulting timber is generally used for pulpwood, fencing, pallet products or wood energy (Teagasc, 2013).

3.1.2 Clear-felling

Clear-felling describes the harvesting of all marketable trees in a given stand at the end of a forest rotation, which is generally followed by replanting of the stand to replace the harvested trees (DAFM, 2000b). Clear-felling typically occurs when a conifer forest is 30-40 years old, and much later for a broadleaf forest (≥ 100 years old).

3.1.3 Continuous Cover Forestry (CCF)

CCF is an alternative silvicultural approach to clear-felling where trees are periodically removed from a forest, though the forest canopy is permanently maintained, and no felling coupes are formed. As outlined in DAFM (2017), CCF is applicable where timber production is an objective but where other considerations (e.g. biodiversity; water protection; recreation) would benefit from a continuous forest cover, or where a conifer plantation is to be converted into a native woodland owing to proximate environmental sensitivities (e.g. a high-status objective waterbody).

3.2 Harvesting operations

Harvesting within a forestry context typically describes the felling (i.e. cutting down) of standing trees, the removal of lop and top (i.e. branches and brash wood), the cross-cutting of felled stems into size categories, the extraction of timber and the stacking of the log assortments by the roadside. During wind farm construction, keyhole felling is typically carried out which concentrates on the felling of trees standing within the wind farm infrastructure layout. Turbulence felling may also occur, where trees proximate to wind turbines are removed to preclude air turbulence

that would otherwise be created by the forest canopy, as this can adversely affect the wind turbine components (and therefore performance) over time.

3.2.1 Mechanised felling of standing timber

Mechanised timber harvesting is the predominant method for tree felling in Ireland today. This involves the use of specialised harvesting heads, fitted to a purpose-built ground-based machine called a **harvester**. A typical harvesting machine is illustrated in Figure 3.1. Harvesters comprise a base machine, which houses a harvesting head mounted onto a hydraulic arm. Modern harvesters are very efficient and will cut down a tree, delimb it and cut the stem into desired lengths in less than 60 seconds. The machine operator controls the movement of the machine from the harvester cab, which contains an onboard computer system that can be programmed to cut standing trees to the size and length specified by the customer. The harvester will process trees down to 7 cm in size. The remainder of the tree will be placed on the rack in front of the harvester, along with the branches, to act as a brash mat for the harvester to travel on, reducing the risk of soil damage. If required, a harvester can be modified into a low-ground pressure machine that can work across multiple site conditions. To minimise ground disturbance or damage, the wheels on a harvester may also be fitted with tracks or chains, depending on the relevant ground conditions.

Figure 3.1: A typical forestry harvester delimbing a felled tree.

As the harvester works down a rack, it places processed logs to the side where they are accessible for extraction to the roadside. In conifer stands, as the harvester cuts each tree, it will apply a urea solution to the surface of the remaining tree stump. Urea is applied to prevent the colonisation of *Heterobasidion annosum*: this is a serious fungal disease (otherwise known as conifer root and butt rot) that can grow down through root stumps and cause extensive decay in the lower stems of conifer trees (Forest Research, 2024)[1]. Urea application is typically a condition of a tree felling licence unless the trees are within an aquatic zone buffer zone/setback area or on deep peat soil.

[1] Conifer root and butt rot (Heterobasidion annosum) - Forest Research

3.2.2 Manual felling of standing timber

Up to the early 1990s, manual felling using a **chainsaw** was the predominant felling type. Today, it remains a useful option in small-scale forestry, or where trees stand within a buffer zone/setback area outside the reach of the harvesting arm and where machinery access is limited or precluded (Teagasc, n.d.).

3.2.3 Timber extraction

In an Irish forestry context, **s**pecialised wheeled **forwarding machines** (as shown in Figure 3.2) are currently the most widely used timber extraction system. A purpose-built forwarder contains a base machine similar to a harvester but comprises a powered trailer with a hydraulic grapple arm attached and will typically require transportation by a low-loader semi-trailer. A forwarder typically follows a harvester to collect and extract logs to the roadside, where assortments will be carefully stacked for loading onto timber haulage tracks. Like harvesters, forwarders can be fitted with tracks or chains and can remove on average c. 9-12 tonnes per journey (Teagasc, n.d.).

Figure 3.2: A forwarder stacking logs at a designated stacking area.

4. Mitigation measures

The harvesting of forestry crops holds the potential to adversely affect forestry habitats and the wider local environment, with soil erosion, sedimentation and nutrient enrichment of aquatic ecosystems all a possibility. Thus, in advance of any timber harvesting on the development site, there would be several mitigation measures to be implemented to reduce the risk of adverse impacts. This section of the report provides an overview of the various mitigation measures available for forestry harvesting operations, based on existing DAFM/Forest Service standards and guidelines (DAFM, 2019; DAFM, 2024b).

4.1 Mitigation measures for associated harvesting operations

4.1.1 General considerations

All harvesting operations associated with the project must be conducted in strict accordance with all relevant standards and guidelines that have been developed by the DAFM/Forest Service, including:

- Forest Biodiversity Guidelines (Forest Service, 2000)
- Forest Harvesting and Environmental Guidelines (Forest Service, 2000b)
- Forest Harvesting and Water Quality Guidelines (Forest Service, 2000c)
- Forestry and Archaeology Guidelines (Forest Service, 2000d)
- Forestry and the Landscape Guidelines (Forest Service, 2000e)
- Forest Protection Guidelines (Forest Service, 2002)
- Forestry and Freshwater Pearl Mussel Requirements (Forest Service, 2008)
- Standards for Felling & Reforestation (DAFM, 2019)
- Environmental Requirements for Afforestation (DAFM, 2024)
- Forestry Standards Manual (DAFM, 2024b)

Other standard mitigation measures include:

- Works only to be conducted by experienced and competent operators. Operators must don all appropriate P.P.E. while working on-site.

- A safety statement to be issued to ensure that any dangerous or sensitive areas are well known to all relevant individuals. Additionally, the responsible forester to walk the site with all contractors to highlight any prominent site risks or any sensitive habitats present.

- Contingency plans to be designed according to Section 5 of the *Standards for Felling & Reforestation* (DAFM, 2019) and to be triggered if necessary.

- Specific harvest plans to be designed for all associated harvesting operations. These should outline access points, environmental setback areas, timber extraction routes, fuelling and chemical storage areas, log stacking areas, and drain crossing points and include a Hazard Identification and Risk Assessment (HIRA).

- If deemed economically viable, the felling and subsequent extraction of timber should—as far as possible—be conducted at the same time as currently licensed extraction activities to minimise the risk of increased local traffic and noise disturbance.

- Felling and extraction of timber should—as far as possible—be conducted during periods of dry weather. During a period of heavy rainfall, harvesting works should cease until conditions improve to reduce the risk of siltation, rutting and soil compaction.

- Any drains crossed during the extraction phase must be kept clear of any harvesting residues or debris to ensure no blockages or drainage issues arise.

- Exclusion zones must be marked out in advance of harvesting using temporary markers (e.g. bamboo or posts with hi-visibility tape - securely driven into the soil with circa 1.5 metres remaining visible above ground).

4.1.2 Water

In advance of works, a ten-metre exclusion zone must be created from the edge of any aquatic zone (i.e. river, stream, or lake) that overlaps with the harvesting area. An additional five-metre exclusion zone must be created from the edge of any relevant watercourse present on-site. Harvesting machinery must not encroach upon these areas. Trees within reach of the harvester arm should be felled by the harvester and snedded and bunched outside of the exclusion zone. Trees outside machine reach should be felled by a competent chainsaw operator, with all felling directed away from water features. Harvesting works should as far as possible be conducted during periods of dry weather.

To capture and control suspended sediment, silt traps must be installed within relevant watercourses. These should be constructed with durable materials, along and towards the point of outflow of mound drains, where a firm bank exists, and a ten-metre 'buffer zone' containing sufficient vegetation (e.g. grasses, reeds, and shrubs) to filter out any remaining sediment/nutrients can be implemented between a silt trap and a waterway.

Figure 4.1: A silt trap for sediment control on a commercial forest site.

The refuelling and chemical/fuel storage area on the site must be sited in a dry, sheltered and flat location, at least fifty metres from aquatic zones and twenty metres from relevant watercourses and avoiding any exclusion zones. Fuel, oil or chemical containers must not be rinsed out on-site and spent machine oil should be collected for off-site disposal.

Temporary bridging points (TPBs) may be required where it is necessary to cross watercourses during harvesting operations: these may comprise logs lined lengthwise, overlaid with a geotextile membrane and brash to capture falling soil from machinery wheels, and should only be constructed where soil and bank sides are stable. The condition of TPBs must be carefully monitored throughout operations, and TPBs over relevant watercourses should be cleaned out and supplemented as necessary. For aquatic zones, crossings should be avoided as far as possible, though where unavoidable, a clear span log structure must be used. Temporary bridging points must be carefully removed post-harvesting, with due care afforded to avoid dislodging any collected sediment as brash padding is peeled back (DAFM, 2019).

Note regarding replacement lands planting: where an aquatic zone exists within or adjacent to a forestry plot a suitable planting setback area must be implemented based on various site considerations as shown in Table 4.1.

Table 4.1: Planting setback areas for aquatic zones (DAFM, 2024).

Slope leading to an Aquatic Zone	Planting setback width	Setback width for peat soils or sites within subbasin of a high-status objective waterbody
Moderate (0-15%)	10 metres (from edge)	20 metres (from edge)
Steep (15-30%)	15 metres (from edge)	25 metres (from edge)
Very steep (> 30%)	20 metres (from edge)	25 metres (from edge)

Fertiliser or herbicide should only be applied on a strictly where-necessary basis and during periods of dry and calm weather. These must not be applied within 20 metres of an aquatic zone or other waterway setback areas, including specified distances from open wells, boreholes or water abstraction points as per S.I.155/2012 (DAFM, 2019).

4.1.3 Soil

Brash mats must be laid along all extraction routes to preserve soil quality, avoiding any waterway exclusion zones. Additional brash should be used to reinforce sections of soft ground that are subject to high levels of machinery passage. Brash mats should be replaced as soon as they show signs of wear, and contractors should regularly monitor all extraction routes for signs of soil damage - using extra brash (where available) to pre-empt the risk of soil rutting. Where ground conditions begin to visibly deteriorate, a new track must be promptly established containing a new brash mat layer. Once felling works begin, harvesting contractors should use the general timber extraction routes and stacking areas as marked on a harvest plan map, and brash must kept out of watercourses and exclusion zones. During timber removal, the extraction route should be directed away from watercourses and the associated machinery must not encroach upon any exclusion zones. Load sizes on forwarders should be monitored during the timber extraction phase to ensure no overloading occurs and to further reduce the risk of soil compaction or rutting (DAFM, 2019).

Figure 4.2: A brash mat layer on a harvesting rack.

4.1.4 Habitats

Tree felling works can lead to fragmentation and a loss of commuting or foraging habitats for wildlife species, and careful consideration must be afforded to the presence of mammal or bird species within the development area. In advance of harvesting operations, an on-site walkover should be conducted to assess the harvesting area for any important habitats that may be present and that require protection during harvesting works, e.g. a ≥ twenty-metre exclusion zone in each direction around a badger (*Meles meles*) sett. Other measures for consideration include:

- The retention and protection of existing hedgerows on a site during harvesting through a five-metre exclusion zone. Hedgerows are often an important habitat for fauna, providing food (e.g. flowers and berries) and cover for the movement of numerous species across the landscape.
- The retention of old and windfirm broadleaf trees, especially native trees containing deeply fissured bark, cavities and woodpecker or rot holes, which can serve as an important habitat for certain species.
- The retention of deadwood during harvesting operations, which may comprise standing dead trees, logs deliberately left behind on the forest floor or naturally fallen branches or stems.

4.1.5 Archaeology

All guidelines concerning forestry and archaeological features must be strictly adhered to. A ≥ twenty-metre exclusion zone must be created around any recorded sites or features within the development area. Machinery passage and timber stacking must strictly be avoided within this zone, and it should be marked out before felling works begin. All tree felling should be directed away from archaeological features. Harvesting operators should be reminded to remain vigilant throughout operations for any undiscovered archaeological features that may be present. In the event such a feature is discovered, the appropriate authorities (i.e. National Museum of Ireland; the Garda Síochána) must be immediately notified, and a ≥ twenty-metre exclusion zone must be implemented around the feature until the significance of the site has been investigated (DAFM, 2024; Forest Service 2000d).

4.1.6 Landscape

The wider landscape should be considered during replanting works associated with wind farm development, whether it concerns in situ planting or the afforestation of replacement land(s). To foster greater integration into a local landscape straight or horizontal lines in a forest should be avoided wherever possible. This can be achieved by implementing landscape setback areas at the planting stage. Wider and irregular spacing of trees close to the forest edge can also help to buffer conspicuous forest margins, and the planting of native Irish tree species along forest edges can improve the overall visual quality of the forest by providing contrasting textures and colours (DAFM, 2024).

Consideration must also be given to ensure new forestry will not block light and cast shade on neighbouring properties and public roads, and all guidelines relating to forestry and utilised buildings and public roads must be adhered to:

- A 60-metre planting setback to be implemented from the outer wall of any residential dwellings which are located proximate to forestry. This may be reduced to a 30-metre setback with written permission from a landowner. The planting setback should vary in distance to avoid straight lines of forestry and to produce a more natural scalloped forest edge. Important local viewpoints should also be considered at this stage: these may be retained by introducing open spaces into a replanting operation.

- A ≥ 20-metre unplanted setback from the surfaced edge of any public road which crosses or adjoins a conifer forest. This may include a 10-metre-wide broadleaf strip starting ten metres back from the edge of the road. The setback area should be increased as appropriate to provide greater visibility where a public road bends.

4.1.7 Service Features

All overhead and underground utility lines (e.g. electricity, water or gas) must be identified before works commence. Works that are scheduled to occur near electricity powerlines should be carried out according to Section 7 of the *Forestry Standards Manual* (DAFM, 2024b). Where it is necessary to direct harvesting operations close to or underneath powerlines, safety goalposts and signage must be erected in advance to ensure safe machinery passage.

Note regarding replacement lands planting: where electricity powerlines traverse a site that is due for afforestation a corridor of a certain width must be left unplanted (DAFM, 2024b). The width of the corridor to remain unplanted is determined by the voltage of the powerline overhead as illustrated in Table 4.2.

Table 4.2: Corridor widths under electricity powerlines (DAFM, 2024b).

Powerline type	Width of unplanted corridor (centred)
Low voltage (230v / 440 v)	None (branch/treetop clearance only)
10 kV and 38 kV	20 metres
110 kV	61 metres
220 kV	68 metres
400 kV	74 metres

It is important to note that the unplanted area beneath a powerline cannot be considered as replacement land area. However, as it will be left unplanted and no longer farmed, it will in time develop into a natural habitat for the benefit of local biodiversity.

4.1.8 People

In advance of any timber harvesting operations, all relevant prohibitive and safety signage should be erected on and around the site, and emergency contact numbers should be kept available on-site.

To control levels of noise and light pollution at the development site, timber harvesting should be restricted to specific working hours, and throughout harvesting works, any proximate public roadways or right of ways must be kept clear of any harvesting debris or residues.

Figure 4.3: A forester supervising the loading of a timber haulage truck.

Timber stacking areas should be located at least 100 metres from residential properties wherever possible, and supervision by the responsible forester(s) should include confirming hauliers leave timber stacks in a safe and stable condition during the removal of timber from the site.

Where replanting has occurred, the use of fertiliser or an appropriate herbicide must be conducted in full accordance with best practice (DAFM, 2024b; DAFM, 2019) - Herbicide or fertiliser should not be applied if high winds or heavy rain are forecast, or within the 60-metre planting setback area for residential dwellings.

5. Replanting Obligations

5.1 Overview of felling categories and associated requirements

Forest Service policy outlines different tree removal scenarios, as described in the *Felling and Reforestation Policy*[2] document (DAFM, 2017). Table 5.1 summarises the six main scenarios where permanent tree removal may be permitted, and whether alternative afforestation and/or the repayment of grants and premiums are required.

The Moanmore Lower WF project relates to 'Scenario 2' in Table 5.1 and would thus require the submission of a felling licence application for the consideration of the Department of Agriculture, Food and the Marine. The Forest Service would subsequently notify the applicant if the removal of trees has been approved or not. If approved, tree felling typically may not commence until 14 working days have elapsed after the date of signature on the licence. Several conditions may be attached to the licence which must be strictly adhered to during felling works. For example, these may typically include the treatment of conifer stumps with urea to mitigate against the forest pathogen *Heterobasidion annosum*, and the responsibility of the landowner to ensure any wild animals protected under Wildlife Act 1976 - 2010 are not impacted by the forestry operations associated with the licence. Where deforestation approval is granted, requirements for the replanting of replacement land(s) would be specified in an alternative replanting condition.

[2] Available at: https://www.gov.ie/en/publication/19b8d-tree-felling-licences/.

Table 5.1: Scenarios where permanent removal of forest may be considered (DAFM, 2017).

Scenarios	Felling Licence application required?	Alternative afforestation required?	Refunding of grant & premiums required?
1. Overriding environmental considerations (e.g. to protect habitats/species listed as qualifying interests within SACs and SPAs)	Yes	No	No
2. Supporting renewable energy and energy security (e.g. windfarm installation)	Yes	See Table 5.2	See Table 5.2
3. Commercial development (e.g. development of an industrial park)	Yes	Yes	Yes
4. Conversion to agricultural land	Yes	Yes	Yes
5. Public utilities (e.g. erection of an electricity power line)	No	No	Yes
6. Other land use change (may be considered on a case-by-case basis, on application)	Yes	Case-by-case	Case-by-case

Table 5.2 illustrates the requirements for each category of tree felling associated with wind farm development.

Table 5.2: Requirements for each felling category associated with wind farm development (DAFM, 2017).

Category of tree felling		Reforestation of felled area required?	Alternative afforestation required? (See Note 1)	Refunding of grant & premiums required? (See Note 2)
Infrastructure felling		No	Yes	Yes
Construction felling		Yes	No	No
Turbulence felling	**≤ 20 ha**	Yes	No	No
	> 20 ha	Yes	Yes - 10% of turbulence fell area	No

Note 1: If 'YES', the alternative site must be of an area equivalent in size (see Section 5.7 of 'Felling and Reforestation Policy'). If the forest area proposed for permanent removal is still in receipt of premiums and/or is still in contract under the Afforestation Grant & Premium Scheme, the alternative site may be eligible under the Afforestation Grant & Premium Scheme.

Note 2: If 'YES', the refunding of any afforestation grants and premiums already paid out by the Forest Service is required if the forest area proposed for permanent removal is still in receipt of premiums and/or is still in contract under the Afforestation Grant & Premium Scheme. Also, if 'YES' or 'NO', if premiums are still being paid, premium payments on the area will cease.

5.1.1 Infrastructure felling

The permanent removal of trees and forests is permitted only in certain circumstances – this category of tree-felling generally relates to infrastructural felling for wind farm projects, and mitigating measures form part of the decision-making process, including the afforestation of alternative lands and/or the refunding of grant and premium payments already disbursed by the Forest Service (DAFM, 2017).

5.1.2 Construction felling

During the construction phase of a wind farm, there may be forested areas that require the temporary removal of forestry (i.e. construction felling) to facilitate the construction of temporary site compounds or for borrow pits for the extraction of rock aggregate. Once construction works have been completed, this land is then repaired and reforested in situ. The afforestation of alternative land(s) and the repayment of grant and premium payments are not required in these instances (DAFM, 2017) - there would be no temporary felling required for this development.

5.1.3 Turbulence felling

Turbulence felling may also be required in the immediate environs of wind turbines to preclude air turbulence that would otherwise be created by the existing forest canopy. As illustrated in Table 5.2, if the total area of forestry subject to turbulence felling is equal to or less than 20 hectares, then no replacement land(s) or refunding of grant and premium repayments is required, though the felled areas must be replanted in situ. It is important to note that upon granting of a licence for 20 hectares (or less) of turbulence felling, if any subsequent cumulative felling is applied for to the Department this will be added to the previous total turbulence felling area, and the rules regarding turbulence felling will now apply to the amalgamated area (i.e. replacement lands may now be required if the total area exceeds 20 hectares). Where a turbulence felling area is greater than 20 hectares then compensatory planting of replacement land(s) equivalent to 10% of the total turbulence area is required, in addition to the replanting of the felled areas on the site (DAFM, 2017).

5.1.4 Compensatory afforestation required for project

To facilitate the proposed wind farm at Moanmore Lower, approximately 0.85 hectares of existing commercial forestry—solely comprising Sitka spruce—would need to be felled (Table 5.3) to facilitate the construction of a Blade Transfer Area.

As outlined in the *Felling and Reforestation Policy* (DAFM, 2017), all areas due to be permanently felled would need to be replaced through the compensatory afforestation of an equivalent area of replacement land (Table 5.2). The afforestation of any replacement land would first require technical approval by the Minister for Agriculture, Food & the Marine under the Forestry Act 2014, and its consent is regulated under the Forestry Regulations 2017 (S.I. No. 191 of 2017).

The project developer is fully committed to the sourcing of appropriate replacement lands, and a non-grant-aided afforestation licence will be sought from the Department of Agriculture, Food, and the Marine to ensure that all felled areas will be replaced on a compensatory basis.

Table 5.3: Total area of existing forestry to be removed and replaced during the development.

Infrastructure type	Area of forestry to be removed (ha)	Tree species present	Replacement land required for afforestation (ha)
Blade Transfer Area	0.85	Sitka Spruce	0.85
Total:	**0.85**		**0.85**

5.1.5 Other considerations

The Forest Service may also require a developer to report on the potential loss of soil and biomass CO^2, and the reduction in productivity of the forest area associated with different wind farm forest management and landscape plans.

The following will also apply concerning the afforestation of replacement land(s):

- The proposed afforestation of alternative land(s) must be evaluated and (if deemed suitable) approved by the Forest Service under the Forestry Act 2014 and associated Regulations before the associated felling licence can be granted.
- The proposed alternative land(s) should be submitted for afforestation approval as early as possible, and before the felling licence application is submitted, so pre-approval details can be included in the felling application.
- Afforestation approval must be applied for by a registered forester using the Afforestation Pre-Approval Form (Form 1) or electronically via the DAFM *IFORIS* system.
- If the forest area proposed for permanent removal is still in receipt of premiums and/or is still in contract under the Afforestation Grant & Premium Scheme, the alternative site may be eligible under the Afforestation Grant & Premium Scheme.
- The standard procedures regarding the evaluation of afforestation applications generally will apply, regarding referrals, protocols (e.g. acid sensitivity protocol), AA screening, EIA determination etc.
- It will be a condition of the felling licence (if issued) that alternative land approved for afforestation is planted and managed as forest land by the relevant standards set out in the *Forestry Standards Manual* (DAFM 2024b).

While the impacts of the felling activities are considered at this application stage, it is noted the felling of trees at the site for the wind farm construction is subject to and can only occur following the grant of a felling licence by the Forest Service. Planning permission for the project may not be granted or, if granted, may have amendments introduced by condition(s). Therefore, the exact area of forestry to be licenced under a felling licence can only be determined once planning permission for the wind farm project has been granted.

Furthermore, as previously stated, it will be a condition of a felling licence that a spatially consistent area of land shall be afforested on a compensatory basis for all permanently felled areas associated with the project. The exact area of land(s) required for afforestation can also only be known once planning permission has been granted for the wind farm

project. Therefore, the application for felling and afforestation licences can only, in practical terms, be made once planning permission has been granted.

The first step of the process would involve the developer engaging with a registered Forester/Forestry company to prepare and submit a non-grant-aided afforestation licence application and a tree felling licence application to the Department of Agriculture, Food and the Marine for appraisal. These applications must outline in detail all activities required for the sites, including environmental sensitivities, a harvesting plan and associated mitigative measures, ground cultivation and drainage, fencing and fertilization (if required) and tree species to be planted etc. It should be noted that an afforestation licence granted by the Department expires three years from the date it is approved.

It is also important to note that under the Afforestation Programme 2023-2027, stringent environmental considerations have been introduced which may preclude part or all of a site from afforestation, and these would need to be considered when evaluating sites for replacement land planting. These considerations include Natura 2000 sites or Natural Heritage Areas, High Nature Value Farmland, Peat soils, Breeding Wader Bird Hotspots, Semi-Natural Grassland and Hen Harrier (*Circus cyaneus*) breeding areas. Depending on the nature of the overlap, submission of a Natura Impact Statement (NIS) or additional ecological, ornithological or soil reports (in accompaniment with the afforestation application) may also be required.

6. Conclusion

To facilitate the construction of a Blade Transfer Area as part of the proposed wind farm, the development at Moanmore Lower would require the removal of 0.85 hectares of existing commercial forestry through mechanised timber harvesting. Under the proviso that the proposed mitigation measures are adopted, no significant residual impacts would be expected.

6.1 Summary of Impacts – Wind Farm Construction Phase

Receptor	Potential Impact	Mitigation Proposed	Residual Effect
Existing commercial forestry	Permanent removal of 0.85 hectares of forestry for the construction of a Blade Transfer Area	0.85 ha of compensatory afforestation to be undertaken on replacement land(s)	Negligible

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